



Atty. Dkt. No. SDUC1160-1 (041673-3603) IFW

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: WOODS et al.

Title: METHODS FOR THE DETERMINATION OF PROTEIN THREE-DIMENSIONAL STRUCTURE EMPLOYING HYDROGEN EXCHANGE ANALYSIS TO REFINE COMPUTATIONAL STRUCTURE PREDICTION

Appl. No.: 10/577,179

International 11/1/2004  
Filing Date:

Examiner: Unknown

Art Unit: 1631

Confirmation 4048  
Number:

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I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date below.	
<u>Stephen E. Peter</u> (Printed Name)	
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6/29/07 (Date of Deposit)	

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Sir:

Submitted herewith on Form PTO/SB/08 is a listing of documents known to Applicants in order to comply with Applicants' duty of disclosure pursuant to 37 CFR §1.56.

A copy of each non-U.S. patent document and each non-patent document is being submitted to comply with the provisions of 37 CFR §1.97 and §1.98.

The submission of any document herewith, which is not a statutory bar, is not intended as an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document which is determined to be a *prima facie* art reference against the claims of the present application.

**TIMING OF THE DISCLOSURE**

The listed documents are being submitted in compliance with 37 CFR §1.97(b), before the mailing date of the first Office Action on the merits.

**RELEVANCE OF EACH DOCUMENT**

All of the documents are in English.

Applicants respectfully request that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

Although Applicant believes that no fee is required for this Request, the Commissioner is hereby authorized to charge any additional fees which may be required for this Request to Deposit Account No. 19-0741.

Respectfully submitted,

Date 6/29/07

By Stephan E. Reiter

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Stephen E. Reiter  
Attorney for Applicant  
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Substitute for form 1449/PTO <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> JUL 02 2007 PATENT & TRADEMARK OFFICE use as many sheets as necessary)				<b>Complete if Known</b>	
Sheet	1	of	16	Application Number	10/577,179
				Filing Date	11/1/2004
				First Named Inventor	Virgil L. Woods
				Art Unit	1631
				Examiner Name	Unknown
				Attorney Docket Number	SDUC1160-1 (041673-3603)

**U.S. PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
	A1	4,762,785	08-09-1988	Comai	
	A2	5,451,513	09-19-1995	Maliga et al.	
	A3	5,545,817	08-13-1996	McBride et al.	
	A4	5,658,739	08-19-1997	Woods, Jr.	
	A5	6,291,189	09-18-2001	Woods, Jr.	
	A6	6,331,400	12-18-2001	Woods, Jr.	
	A7	6,599,707	07-29-2003	Woods, Jr.	

**UNPUBLISHED U.S. PATENT APPLICATION DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	U.S. Patent Application Document	Filing Date of Cited Document MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Serial Number-Kind Code <sup>2</sup> (if known)			

**FOREIGN PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T <sup>6</sup>
		Country Code <sup>3</sup> Number <sup>4</sup> Kind Code <sup>5</sup> (if known)				

**NON PATENT LITERATURE DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>6</sup>
	A8	Altmann et al., "Pathways and Intermediates in Forced Unfolding of Spectrin Repeats", Structure (Camb), 10:1085-1096, 2002	
	A9	Bai et al., "Thermodynamic Parameters from Hydrogen Exchange Measurements", Methods Enzymol., 259:344, 1995	

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	A10	Bai et al., "Primary Structure Effects on Peptide Group Hydrogen Exchange", Proteins: Structure, Function, and Genetics 17:75-86, 1993	
	A11	Baldwin, "Temperature Dependence of the Hydrophobic Interaction in Protein Folding", Proc Natl Acad Sci USA, 83:8069-72, 1986	
	A12	Beasty et al., "Characterization of an Early Intermediate in the Folding of the $\alpha$ Subunit of Tryptophan Synthase by Hydrogen Exchange Measurement", Biochemistry, 24:3547-3553, 1985	
	A13	Beaton, A. and Tukey, J.W., "The Fitting of Power Series, Meaning Polynomials, Illustrated on Band-Spectroscopic Data", Technometrics, 16: 147-192, 1975	
	A14	Benjamin et al., "Long-Range Changes in a Protein Antigen Due to Antigen-Antibody Interaction", Biochemistry, 31:9539-0545, 1992	
	A15	Breddam, "Serine Carboxypeptidases. A Review", Carlsberg Res. Commun., 51:83-128, 1986	
	A16	Burz et al., "Mapping Structural Perturbations in Escherichia Coli Aspartate Transcarbamylase by Medium Resolution Hydrogen Exchange", Biophys. J., 49:70-72, 1986	
	A17	Chen et al., "Probing the ligand binding domain of the GluR2 receptor by proteolysis and deletion mutagenesis defines domain boundaries and yields a crystallizable construct", Protein Science, 7:2623-2630, 1998	
	A18	Chung et al., "Hydrogen exchange properties of proteins in native and denatured states monitored by mass spectrometry and NMR", Protein Sci., 6:1316-24, 1997	
	A19	Cohen et al., "Probing the solution structure of the DNA-binding protein Max by a combination of proteolysis and mass spectrometry", Protein Science, 4:1088-1099, 1995	

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	A20	Connelly et al., "Isotope Effects in Peptide Group Hydrogen Exchange", Proteins: Struct. Funct. Genet., 17:87-92			T <sup>6</sup>
	A21	D'Aquino et al., "The Magnitude of the Backbone Conformational Entropy Change in Protein Folding", Proteins, 25:143-56, 1996			
	A22	Deng and Smith, "Identification of Unfolding Domains in Large Proteins by Their Unfolding Rates", Biochemistry, 37:6256-6262, 1998			
	A23	Dharmasiri and Smith, "Mass Spectrometric Determination of Isotopic Exchange Rates of Amide Hydrogens Located on the Surfaces of Proteins", Anal. Chem., 68:2340-2344, 1996			
	A24	Dunker et al., "Protein Disorder and the Evolution of Molecular Recognition: Theory, Predictions and Observations", Pac. Symp. Biocomput., 3:473-484, 1998			
	A25	Engen et al., "Investigating Protein Structure and Dynamics by Hydrogen Exchange MS", Analytical Chemistry, 73:256A-265A, 2001			
	A26	Englander et al., "Protein hydrogen exchange studied by the fragment separation method", Anal. Biochem., 147:234-244, 1985			

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	A27	Englander et al., "Hydrogen-Tritium Exchange Survey of Allosteric Effects in Hemoglobin", Biochem., 26:1846-1850, 1987	
	A28	Englander et al., "Individual Breathing Reactions Measured in Hemoglobin by Hydrogen Exchange Methods", Biophys. J., 10:577, 1979	
	A29	Englander et al., "Hydrogen-Tritium Exchange of the Random Chain Polypeptide", Biopolymers, 7:379-393, 1969	
	A30	Englander et al., "Hydrogen Exchange Studies of Respiratory Proteins", J. Biol Chem., 248:4852-4861, 1973	
	A31	Englander et al., "Structure and Energy Change in Hemoglobin by Hydrogen Exchange Labeling", Methods Enzymol., 232:26-42, 1994	
	A32	Englander et al., "Hydrogen-Tritium Exchange", Methods Enzymol., 26:406-413, 1972	
	A33	Englander et al., "Hydrogen-Tritium Exchange", Methods Enzymol., 49:24-39, 1978	

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	A34	Englander et al., "Protein structure change studied by hydrogen-deuterium exchange, functional labeling, and mass spectrometry", Proc. Natl. Acad. Sci., USA 100:7057-7062, 2003	
	A35	Englander et al., "Hydrogen exchange: The modern legacy of Linderstrom-Lang", Protein Science, 6:1101-9, 1997	
	A36	Fusek et al., "Enzymic Properties of Thermopsin", J. Biol. Chem., 265:1496-1501, 1990	
	A37	Garner et al., "Predicting Disordered Regions from Amino Acid Sequence: Common Themes Despite Differing Structural Characterization", Genome Inform., 9:201-214, 1998	
	A38	Gomez et al., "The Heat Capacity of Proteins", Proteins, 22:404-12, 1995	
	A39	Grum et al., "Structures of Two Repeats of Spectrin Suggest Models of Flexibility", Cell, 98:523-535, 1999	
	A40	Habermann et al., "Energetics of hydrogen bonding in proteins: A model compound study", Protein Sci., 5:1229-39, 1996	

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	A41	Hamuro and Woods, "High Resolution, High-Throughput Amide Deuterium Exchange-Mass Spectrometry (DXMS) Determination of Protein Binding Site Structure and Dynamics: Utility in Pharmaceutical Design", J. Cell. Biochem., 37:89-98, 2001	
	A42	Hamuro et al., "Domain Organization of D-AKAP2 Revealed by Enhanced Deutrium Exchange-Mass Spectrometry (DXMS)", J. Mol. Biol., 321:703-714, 2002	
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	A45	Hilser et al., "Structure-based statistical thermodynamic analysis of T4 lysozyme mutants: structural mapping of cooperative interactions", Biophys. Chem., 64:69-79, 1997	
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	A47	Hilser et al., "The Enthalpy Change in Protein Folding and Binding: Refinement of Parameters for Structure-Based Calculations", Proteins, 26:123-33, 1996	

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	A49	Hilser, et al., "Structure-based Calculation of the Equilibrium Folding Pathway of Proteins. Correlation with Hydrogen Exchange Protection Factors", J. Mol. Biol., 262:756-72, 1996			
	A50	Hilser, V.J., "Protein Structure, Stability, and Folding", Methods Mol Biol, 168:93-116, 2001			
	A51	Hoofnagle et al., "Changes in protein conformational mobility upon activation of extracellular regulated protein kinase-2 as detected by hydrogen exchange", Proceedings, National Academy of Sciences, 98:956-961, 2001			
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	A53	Kim et al., "Influence of Charge on the Rate of Amide Proton Exchange", Biochemistry, 21:1, 1982			
	A54	Kim et al., "Protein Internal Flexibility and Global Stability: Effect of Urea on Hydrogen Exchange Rates of Bovine Pancreatic Trypsin Inhibitor", Biochemistry, 32:9609-9613, 1993			

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				Filing Date	11/1/2004
				First Named Inventor	Virgil L. Woods
				Art Unit	1631
				Examiner Name	Unknown
Sheet	8	of	16	Attorney Docket Number	SDUC1160-1 (041673-3603)

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	A55	Kim et al., "Intramolecular Interactions in Chemically Modified Escherichia coli Thioredoxin Monitored by Hydrogen/Deuterium Exchange and Electrospray Ionization Mass Spectrometry", Biochemistry, 40:14413-21, 2001	
	A56	Kim et al., "Site-Specific Amide Hydrogen/Deuterium Exchange in E. coli Thioredoxins Measured by Electrospray Ionization Mass Spectrometry", J Am Chem Soc, 123:9860-6, 2001	
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	A58	Krishnan et al., "Purification of an acid protease and a serine carboxypeptidase from Aspergillus niger using metal-chelate affinity chromatography", J. Chromatography, 329:165-170, 1985	
	A59	Kwong et al., "Probability Analysis of Variational Crystallization and Its Application to gp120, The Exterior Envelope Glycoprotein of Type 1 Human Immunodeficiency Virus (HIV-1)", J. Biol. Chem., 274:4115-4123, 1999	
	A60	Lamzin et al., "Current state of automated crystallographic data analysis", Nature Structural Biology, November 7, 2000, Supplement:978-981, 2000	
	A61	Lattman, E., "Use of the Rotation and Translation Functions", Meth. Enzymol., 11:55-77, 1985	

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	A67	Louie et al., "Salt, phosphate and the Bohr effect at the hemoglobin beta chain C terminus studied by hydrogen exchange", J. Mol. Biol., 201:765-772, 1988	
	A68	Mallikarachchi et al., "Effects of ATP and CTP on the Conformation of the Regulatory Subunit of Escherichia coli Aspartate Transcarbamylase in Solution: A Medium-Resolution Hydrogen Exchange Study", Biochemistry, 28:5386-5391, 1989	

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	A104	Winger et al., "Probing Qualitative Conformation Differences of Multiply Protonated Gas-Phase Proteins via H/D Isotopic Exchange with D <sub>2</sub> O", J. Am. Chem. Soc., 114:5897-5989, 1992	
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	A110	Xie, et al., "Thermodynamic characterization of an equilibrium folding intermediate of staphylococcal nuclease", Protein Sci., 3:2175-84, 1994	

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Sheet	16	of	16	Application Number	10/577,179
				Filing Date	11/1/2004
				First Named Inventor	Virgil L. Woods
				Art Unit	1631
				Examiner Name	Unknown
				Attorney Docket Number	SDUC1160-1 (041673-3603)

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	A111	Yan et al., "Hydrogen/deuterium exchange and mass spectrometric analysis of a protein containing multiple disulfide bonds: Solution structure of recombinant macrophage colony stimulating factor-beta (rhM-CSF $\beta$ )", Protein Sci., 11:2113-24, 2002	
	A112	Yan et al., "Crystal Structure of the Repetitive Segments of Spectrin", Science, 262:2027-2030, 1993	
	A113	Zawadzki et al., "Dissecting interdomain communication within cAPK regulatory subunit type II $\beta$ using enhanced amide hydrogen/deuterium exchange mass spectrometry (DXMS)", Protein Sci., 12:1980-1990, 2003	
	A114	Zhang et al., "Structural comparison of recombinant human macrophage colony stimulating factor $\beta$ and a partially reduced derivative using hydrogen deuterium exchange and electrospray ionization mass spectrometry", Protein Sci., 10:2336-45, 2001	
	A115	Zhang et al., "Determination of amide hydrogen exchange by mass spectrometry: A new tool for protein structure elucidation", Protein Sci., 2:522-531, 1993	
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